

REMARKS

Claims 1-20 and 22-23 are pending herein. Reconsideration is respectfully requested of the following grounds of rejection, herein below.

Claim Rejections

I. (A) Claims 1-5, 8, 10-17 and 19-20 under 35 U.S.C. §103(a) in view of the article by C.F. Madigan (Improvement of output coupling efficiency of organic light-emitting diodes by backside substrate modification, XP-0009505101, *Applied Physics Letters*, Volume 76, Number 13, 27 March 2000, hereafter "Madigan") disclosed by the Applicant, and Brass et al. (U.S. 6,979,104, hereinafter "Brass").

The Office Action asserts Madigan substantially discloses the claimed invention including an OLED, but Madigan fails to disclose a light source with its optical axis laterally shifted from the central axis of a lens, or lenses of different geometric configurations. However, it is asserted that Brass teaches a light source with its optical axis laterally shifted for the purpose of yielding a beam with increased focus, and it would have been obvious to a person of ordinary skill in the art to manipulate the lens in Madigan to achieve a desired effect.

(B) Traversal

(i) Microlenses embedded on a substrate as in the present invention are not movable or displaceable

Applicant respectfully submits the combination of Madigan and Brass fails as a combination to disclose or suggest all of the recited elements in the rejected claims. Brass, which is directed to an inspection lamp, discloses the following at column 5, lines 3 to 15:

a lens may be movable to permit adjust of beam characteristics. The focal height of the lenses ... may be adjustable so as to permit changing the distance at which beam size and intensity formed by each light emitting diode

and each associated lens are best-formed. The distance between lens centers may be smaller than the distance between the centers of their associated light emitting diodes so that the beam components formed by each lens from its associated light emitting diode converges towards each other.

Thus, Brass discloses adjusting the beam by moving the lens, and Madigan does not make up for this deficiency.

In other words, Brass discloses an embodiment wherein the luminous beams emitted by the plurality of light sources of the inspection lamp are all directed towards a target area or point to obtain a single spot in a pre-defined plane (see last three lines of col. 4 and first line of col. 5- see also col. 7, lines 2-5).

The possibility of adjusting the relative position between the LED's and the axis of the lens is always referred to the object to make the resulting beams converge onto each other at a predefined point (see also col. 12, lines 36-45). See also col. 12, lines 62-65, wherein it is clear that the LED's are offset from the axes of their associated lenses to obtain beams that coincide at a specific distance forward of the lenses.

Applicants also respectfully submit that claim 24 of Brass recites an inspection lamp having "two or more light emitting diodes ... wherein the individual beams converge towards each other such that the axes of the beam intersect with each other at a specific distance forward of the lenses... ."

Furthermore, the Abstract of Brass repeats and outlines that the resulting beam is focused in a target area at a target distance from the lens.

In contrast to the combination of Madigan and Brass, the present invention recites the use of microlenses (having a size on the order of a micron) directly molded on a substrate. Therefore,

there is no possibility either to make a lens movable or to displace a lens with respect to the relative LED, to have a shift between the LED and the optical axis of the lens, because the lens are molded into the substrate.

- (ii) Madigan and Brass involve very different technological fields which would not be obvious to combine

In addition, Brass discloses an inspection lamp having a very low number of LED's, in the range of single digits or on the order of ten units at a maximum (in the figures in this patent the maximum number of LED's is eight). In contrast, the present patent application refers to the technology of microlenses associated with thousands or more of organic leds (OLEDs), each having a size on the order of microns.

It is respectfully submitted a person of ordinary skill in the art would recognize the present invention refers to a field of the production of light sources using OLED technology (see also the article to Madigan, which is in the same field as the claimed invention). In contrast, Brass, which refers to the field of inspection lamps, is in a different field than the present invention and cannot be compared to the present invention.

Thus, Applicant respectfully submits the teachings of Brass and Madigan are not combinable. They refer to completely different fields and one cannot be said to be analogous art of the other used to solve a similar problem.

- (iii) Sizes applied to the distances between the lens and the optical sources are very different in the present invention as compared with Brass

Moreover, as explained in more detail hereinafter, in the present invention the sizes applied to the distances between the lens and the optical sources are on the order of microns (see, for example, page 12, lines 6-8). In contrast, in the patent to Brass the sizes are on the order of

tenths of millimeters (e.g. col. 12, lines 40-42), whereas the interaxes between the lenses are on the order of hundreds of millimeters.

Also, in the present invention the shifting between the micro-lens and the point of light emission is directed to the object "to create a plurality of light emission points focused in a desired manner by means of the specific design of the lenticular element 21" (page 12, lines 10-12, and see at least claim 5).

More particularly, as explicitly disclosed in the article entitled "*Efficient Light Extraction and Beam Shaping From Flexible, Optically Integrated organic Light-Emitting Diodes*" by P Melpignano et al. (the present inventors), submitted in the response to the previous Office Action, the last six lines of right column of page 1 and the first three lines of the left column of page 2, read as follows:

The far-field light distribution ... is obtained by the sum of overlapping images of the OLED pixels, which is called a patch pad design. The basic unit of 5 x 5 microlenses forms the desired light distribution in the far field. This approach has two advantages; the emitted light is concentrated and shaped in a specific solid angle, and the light extraction from the OLED multilayer structure is improved by direct optical coupling.

Still referring to the above-mentioned article by *P. Melpignano et al.*, there is shown a Fig. 1 having comments stating, *inter alia*, "The box highlights the engineered 5 x 5 optical unit producing the Gaussian light distribution" which is an example of the "desired manner" in which the light is distributed by using a specific design pertaining to each lens and an individual shifting between the axis of each lens and the relative light source.

This functional feature is reflected by the completely different amount of the shifting, which as said above, is always maintained to be on the order of some millimeters in Brass, whereas it is "some microns, or some tenths of microns: (page 12, lines 7-8 of the specification),

a maximum amount of 15 micrometers (sixth line from the end of right column 1, page 1 of the above-cited article) in the specification of the present invention.

- (iv) Madigan fails to disclose an individual lateral shift, and combined with Brass a person of ordinary skill in the art would not have found suggestion or motivation for an individual lateral shift of the relative center with respect to the relative point of light emission as in the present invention

As previously discussed, Madigan, similar to the present invention, refers to the production of arrays of microlenses having a size on the order of microns. The microlenses are directly molded on a flexible substrate in a number on the order of thousands, and coupled with organic LED's (OLEDs) using very sophisticated techniques, to position with extreme accuracy the center of the lens, which is shifted for a desired value with respect to the crossing points between anode and cathode of the light source (see for example, page 7, lines 19-25).

The overall and individual shifting between the lenses and the light sources is directed to obtain a partial overlapping of the individual beams to create a desired pattern of light distribution in a defined plane.

Brass is directed to lamps having lens and LED's, wherein the shifting between the lens and LED's is directed to focalize the beams so that all the beams converge to a target point at a target distance from the lens.

A person of ordinary skill in the art reading Brass, which refers to an inspection lamp having some single LED's whose beams are focused towards a target, would not have found it obvious to modify the teaching of Madigan, which does not mention the presently claimed recitation that an individual lateral shift of the optical axis is some tenths of a micron, between

each microlens and the relative light source, to obtain a desired distribution of the intensity of the light, for example, a Gaussian distribution.

We note Madigan already discloses an offset between the center of curvature, i.e., the center of the sphere from which the spherical lens is generated, and the point of light emission (the OLED), and this offset is taken in a direction which is orthogonal to the plane where the lenticular element having the microlenses lies.

In other words, Madigan already uses a technique, which is different from that disclosed in the present patent application, and which teaches how to modulate the intensity of the far-field pattern of the light distribution.

There is no hint, therefore, for Madigan to use the teaching of Brass, which refers to a completely different kind of product and technology, to solve a problem that in Brass is different, i.e., to obtain all the beams towards a target point.

Reconsideration and withdrawal of this ground of rejection are respectfully requested.

II. (A) Rejection of Claims 6, 7, 22 and 23 under 35 U.S.C. §103(a)

The Office Action asserts claims 6, 7, 22 and 23 would have been obvious to a person of ordinary skill in the art in view of Madigan because although Madigan admittedly fails to disclose microlenses or a substrate sized as claimed, Madigan does disclose the claimed microlenses being embedded on a substrate and allegedly it would have been obvious to a person of ordinary skill in the art to decrease the size to lower material costs and material processing time thus increasing efficiency, as such a modification would be a "mere change in the size of the existing components."

(B) Traversal

Applicants respectfully submit none of claims 6, 7, 22 and 23 would have been obvious to a person of ordinary skill at the time of invention in view of Madigan.

Applicant does not understand why these claims are rejected solely in view of Madigan. They depend from Claim 1, rejected in view of Madigan combined with Brass, and the Office action at page 3 admitted Madigan does not appear to disclose a light source with its optical axis laterally shifted (a feature found in base Claim 1).

Also, as explained above, Madigan already discloses an offset between the center of curvature, i.e., the center of the sphere from which the spherical lens is generated, and the point of light emission (the OLED), and this offset is taken in a direction which is orthogonal to the plane where the lenticular element having the microlenses lies.

In other words, Madigan already uses a technique, which is different from that disclosed in the present patent application, and which teaches how to modulate the intensity of the far-field pattern of the light distribution.

Moreover, the values of Claims 6, 7, 22 and 23 are significantly lower than measurements (of the lens used during a series of listed trials) shown in Table I of Madigan. Present claim 6 recites a microlens having a thickness of between 1 micron and 100 microns. Claim 7 recites a lateral size of the microlens between 5 microns and 1000 microns. Claims 22 and 23 respectively recite a thickness of between 1 micron and 40 microns, and a lateral size between 10 microns and 300 microns. While Madigan at page 1652, second column, discloses a "few" mms constitutes a lens size, and further says the size could bottom at 100 microns, it is submitted this is not an enabling disclosure. This size difference is not a mere change in the size of the existing components. Reducing the microlens to such a size requires a significantly smaller OLED diameter, and a smaller lens diameter (Madigan, page 1652, 2nd paragraph), and

thinner substrates. Thus, unlike the discussion in MPEP 2144.04 IV A, claims 6, 7, 22 and 23 are not a "mere scaling up [down] of a prior art process... ."

Moreover, present Claim 22 is entirely below even the theorized 100 micron value proposed by Madigan and there is no indication that Madigan enables such a structure.

Also, as mentioned above, Madigan fails to disclose lateral shifting of the optical axis as presently claimed. Thus, the sizes and thicknesses of the microlenses, as recited in claims 6, 7, 22 and 23 are not a mere scaling of anything disclosed by Madigan.

In addition, claims 6, 7, 22 and 23 are also patentable based on their dependency from claim 1, which is submitted to be allowable.

Page 3 of the Office action states, "Regarding the method claims, the method of forming a device is not germane to the issue of patentability of the device itself. Therefore these limitations have not been given patentable weight." Applicants ask reconsideration of this statement. Claims 12-20 are method claims. They are not product by process claims. Method steps have to be considered in method claims. Applicant submits it has recited a series of method steps to create a heretofore unknown lighting device. The series of method steps are new and non-obvious compared to the method to build other types of lighting devices of the cited references, and are thus patentable.

Conclusion

In view of the above, it is respectfully submitted that all rejections are overcome. Thus, a Notice of Allowance is respectfully requested. Please charge any fee deficiency or credit any overpayment associated with this Request for Reconsideration to Deposit Account 19-4375.

Respectfully submitted,

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